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Publisher's Note

Originally, it was planned to incorporate with this issue Volumes III, IV and V of the *Annual Review of Hypnosis*. Since more effort is still required for the optimum preparation of this important contribution the Publisher has decided to hold this supplement until the October issue (Volume III, Number 4). At this time the *Annual Review of Hypnosis* will appear as a section of the *Journal of Clinical and Experimental Hypnosis*.

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Transference and Hypnotic Behavior

JEROME M. SCHNECK, M.D.

In earlier studies the writer discussed spontaneous sensory and motor phenomena in hypnosis, homosexuality-hypnosis identifications, and utilization of the hypnotic interpersonal relationship as a medium in which to expedite therapy (3, 4, 5, 6). These issues will be elaborated further through the presentation and discussion of a patient's behavior entailing several elements of interest.

Hypnosis Data

The patient was an unmarried man in his early twenties. Hypnotic procedure had been employed for part of each psychotherapy interview over a period of several months. During such procedure the patient sat in a chair and entered hypnosis at first with varying degrees of ease and subjective experience of depth. Later on, induction was smooth, simple and rapid, with apparently greater consistency in the level of hypnosis. In earlier sessions, during induction and the hypnotic state itself, the patient's head would fall backward or droop forward or to the side. Later, the patient began to assume increasingly the following posture. His chin would droop toward his chest. His body would move forward so that his back no longer rested against the chair. His shoulders drooped and moved forward. Finally his entire body from hips upward curved markedly as the patient leaned far forward in his chair with his face no longer visible as it looked inwardly toward his own body at the level of lower abdomen or pubis. His feet were planted firmly on the floor with thighs parallel to the floor in normal sitting position. The patient, in his location opposite the therapist and having assumed this extreme postural set, was in a position where his features could be seen no longer and only the top and back of his head were visible. This unusual movement became routine session after session and was not commented on at first by the therapist who simply proceeded with therapy while observing the patient carefully. As such sessions were brought to a close and the hypnosis terminated, the patient would gradually resume his normal sitting position culminating in opening his eyes at the appropriate signal.

At the conclusion of a hypnosis session involving movements just described, the patient was asked whether he was aware of the position he had assumed. Admitting that he was, his associations to this were then sought. His immediate and spontaneous reply was that this position had its "parallel" to use the patient's own word, in a sexual experience he had had when about thirteen years old. This involved anal intercourse with the patient playing the passive role. He had alluded to this episode previously, but only after a period of postponement owing to discomfort and embarrassment.

At a later session the patient referred to his hypnotic behavior and revealed that it had implications for him about which he had been most

hesitant to comment. The position of his head brought into direct view of the therapist the texture of the patient's hair. The patient claimed he was self-conscious about this because he identified the texture with negroid qualities about which he had considerable conflict. This issue had been discussed in treatment and the patient possessed marked impulses to bring this type of problem to the fore in his behavior and discussions in several types of settings. The position and movement during hypnosis served as an additional expression of this conflict and suggested exhibitionistic trends in connection with it. From other evidence on hand it could be interpreted as an attempt by the patient to assure himself that the therapist was not underestimating the importance of this problem for him. The issue of his racial admixture, aside from certain special concerns which presented themselves realistically to this patient, assumed proportions which appeared to be exaggerated to varying degrees at times, and apart from legitimate reality considerations they became involved with neurotic problems. In the opinion of the therapist the emphasis placed on hair texture by this patient was far out of proportion to appearance and significance Most observers would probably have noticed no apparent identifying characteristics. What might be construed as symbolic subservience in the hypnotic posture adopted by the patient was not discussed with him at that time. The sexual issue will, however, be elaborated in the discussion to follow.

Discussion

The patient entered treatment with presenting complaints of difficulty and discomfort in breathing and swallowing. He had a feeling as if "something is sitting on my chest." These feelings made him uncomfortable when he was in the presence of others because he believed they would sense his problem. Because of this he developed anxiety in classrooms when still at school, and later he tried to be selective about work opportunities because he did not want to be in the same room with other people. This discomfort extended itself to traveling in public conveyances. It became clear soon that his conflict about racial admixture played an important role in his avoidance reactions and that it influenced markedly the appearance of certain types of hostilities and allegiances. The result was the development of pervasive malfunctioning character patterns and social anxieties.

Initial emphasis in treatment was on specific symptoms. Then it became possible to extend the scope of the therapeutic approach to broader elements of conflict in personality functioning. A shift developed toward utilization of hypnotic procedure to capitalize on the type of interpersonal relationship toward which the patient was striving and to utilize the procedure as part of the basic aspect of the transference relationship in order to expedite therapeutic progress. Long before clarification of the hypnotic postural set, it had been apparent that the homosexual aspect of the total transference, and of the hypnotic transference specifically, was an important element in treatment. Elucidation of the hypnotic behavior served as additional precise substantiation, lending support and guidance for future procedure. This procedure continued for a while to take the form of employing the hypnotic state as a period for conscious

and unconscious elaboration by the patient of issues discussed in therapy, with the goal of encouraging attempts to arrive at meaningful conclusions and decisions along with resultant modification of total functioning. Hypnotic technique was introduced toward the close of each interview. In keeping with the type of transference just mentioned, it was clear that the patient fostered this therapeutic development by quietly assuming of his own accord a posture associated with the beginnings of hypnotic induction.

Consistent with findings in other cases, the elucidation of the homosexual aspects of the hypnotic transference did not interfere at all with subsequent hypnotic sessions. Furthermore, the patient did not choose to alter his pattern of movement even when it was suggested to him casually that he might possibly be more comfortable if he were to lean back in his chair.

As the patient began to assume more and more his favored posture in hypnosis, the therapist had two thoughts, among others, which may warrant attention. First, he recalled another patient with whom the issue of hypnosis-homosexuality identification also entered the picture. That patient presented data having to do with auto-fellatio. The thought arose that the present patient's posture might be related to auto-fellatio fantasies but this theme was not explored. The data on auto-fellatio were not reported by this therapist but recently material on the subject has appeared in psychiatric literature (1). Second, it was recalled that in centuries past a sect known as Hesychasts in the Greek church would engage in eye fixation induction with the umbilicus as the focal point. This group was known also as omphalopsychics and it has been referred to by Moll in his classic work (2). The body position of the present patient was reminiscent of this practice. Reference to this ocular fixation technique in relation to induction of a trance-like state has been mentioned recently in a popular magazine when alluding to the training of Hindu children in yoga (7).

In previous reports, the writer described in detail a variety of spontaneous sensory and motor phenomena during hypnosis (3, 5). It was shown that such occurrences, which might easily be by-passed as unimportant, may actually be studied and found psychologically meaningful. It was mentioned also that the analysis of such data may be of incidental interest only but that evidence has been gathered illustrating the helpfulness of the data in relation to time and direction of therapy. Such studies could also further knowledge of hypnosis in connection with interpersonal relations. The present case is one which illustrates the occurrence of a spontaneous motor phenomenon in a manner and to a degree that clearly has more than passing significance. It obviously entails much substance as part of a broader aspect of treatment, specifically in its transference involvements. The understandings played a key role in influencing treatment procedure and management. The therapist accepted the patient's wish to cement a bond with him through the gratification derived in this phase of treatment by hypnotic induction and expenditure of time in the hypnotic state. The latter was accepted by the therapist as routine, thus granting this patient's wish at the same time that he encouraged psychological elaboration of data discussed prior to the hypnosis. Difficult aspects of conflict material dealing with problems involving social differences and adjustments,

issues of racial discrimination, and relations with authority figures and groups, appeared capable of being approached and discussed with greater ease as this phase of therapy developed. The very nature of the hypnotic procedure seemed to satisfy the patient's longings relating to personal acceptance, passivity and control, as well as specifically sexual satisfactions. Thus, aside from the various points already discussed, these data furnish an example of one particular approach, among so many others, to the incorporation and utilization of hypnotic technique in certain types of psychotherapy.

Summary

This report describes an extreme posture in hypnosis, spontaneously assumed by a male patient, when the patient, seated in a chair, curved his head, neck, and upper body far forward so that his face finally was turned inward toward his body at the level of lower abdomen or pubis. This spontaneous motor phenomenon, aside from serving as an addition to spontaneous sensory and motor phenomena described previously, continued throughout a series of sessions and reflected symbolically a combination of significant transference issues. Furthermore, this hypnotic behavior was of broad rather than limited interest in treatment and its implications were accepted and used as a base in determining the direction and management of therapy. The constellation of events furnished an additional example of incorporation of hypnotic technique into psychotherapy.

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Hypnosis in the Treatment of Obesity

SEYMOUR HERSHMAN, M.D.

The treatment of obesity, particularly in women, has for many years been an insurmountable problem to the physician. The great number of drugs advocated for the control of diet has progressed to wafers, gum, tablets, liquids, capsules, candies, etc. The amphetamine group, dextro-, levo-, sulphates, phosphates, chlorides, and combinations of any or all; cellulose with and without the above combinations, with and without vitamins, minerals, thyroid, etc., have had varied degrees of efficacy but the results have proven to be almost universally temporary.

It is generally conceded that there must be a deep seated "root" cause or psychogenic basis for the unwillingness to give up overeating. The successful use of placebos for temporary diminution of appetite tends to bear out this conclusion. Psychotherapy has been conceded to be the only treatment with any lasting effect.

The author has developed a simple technique for the treatment of obesity utilizing Hypnosis and Psycho-Biologic therapy ("Hypnotherapy") to effect a reorganization of the thought processes of the subconscious, and a production of fantasies to highly motivate the patient and to allow for ego-acceptance.

Patients were selected at random and carefully screened for organic pathology by a complete physical examination, B.M.R., and other indicated laboratory procedures. Those requiring definitive drug therapy were excluded from this series.

Technique

Hypnosis is induced to the deepest level obtainable by the patient within a reasonable length of time. (The depth may be ascertained by a few tests, but the effectiveness of the treatment is not appreciably altered by depth if the patient is able to reach the medium trance state.)

The patient is asked to visualize herself seated in a theatre. On the stage, behind the drawn curtain, activity can be heard. The patient is next asked to visualize an actress standing on the stage looking through the split in the curtain at the scene taking place back stage. The expression on the actress' face indicates that the scene she is witnessing is a very unhappy one. It is apparent that the actress is extremely depressed and has a "distasteful" sensation of unhappiness, sorrow, even disgust and nausea. This expression increases. It creates a desire on the part of the patient to see what scene could impress such a feeling on the part of the actress. It is suggested that the curtain can now be slowly opened, and on the stage is a group of players enacting the scene which produced the unhappy expression on the

face of the actress-observer. The patient may or may not be asked what she sees at this time.

After a few moments of observation of the scene, the patient is asked to remember the scene and "leave" the theatre, and to visualize herself in another theatre.

In the second situation, a similar fantasy is produced with one exception. This time, the observer on the stage has an expression of extreme contentment, satisfaction, happiness, and peace of mind. The scene which produced this expression is visualized by the patient and she is asked to remember it and to "leave" the theatre and "return" to the physician's office.

In the hypnotic and/or wakeful state, a discussion of what the patient saw in her fantasies may be held and the information obtained used in production of reminders and in subsequent treatments. This discussion, however, is probably not essential.

After "returning" to the office, dietary regimen is discussed. Adherence to diet, she is told, will allow her to fantasy the pleasant scene on the stage and create a similar feeling of pride, joy, happiness, and contentment. Desire to break the diet and the subsequent eating of more than designated amount of food will create the other scene fantasied, she is told, and will produce in her a feeling of being morose, dejected, nauseous, etc.

The patient is also told that if, as in many cases, there is an underlying factor involved in her overeating, that it may be possible for her "unconscious" to re-evaluate the necessity of utilizing this method of satisfying a need.

Suggested verbiage may include the following points:

1. Perhaps five or ten pounds less weight would satisfy her "unconscious" need as well, or perhaps the fact that she could wear *one* size smaller dress would satisfy her needs even more.
2. Maybe this desire to eat more and constantly would be better satisfied if the foods eaten were not pastries, but rather bland, low-calorie foods.
3. This feeling of being desired or wanted (if there was such a feeling on the part of the patient) can actually be realized by the increased value of a slimmer figure.
4. "Isn't it a fact that people who are not overweight are generally longer lived and wouldn't that allow the patient to be able to eat for many more years?"
5. Perhaps it is only *certain* foods that should be distasteful and not the eating of "allowed" foods.

The conversation, by the permissive association of ideas, production of reminders, and perhaps resolution of a basic conflict which may be frustration, privation, etc., is centered around all or as many as possible of the probable sources of the increased appetite.

This technique is repeated but more briefly by selecting the most applicable routine to fit the personality of the individual patient at weekly sessions for four to six weeks, than bi-weekly or monthly sessions for several months, and then on occasional visits. At each visit, the patient is complimented both on the conscious and unconscious levels as to appearance, weight loss, etc.

The following are actual case histories demonstrating the success of the author with the above technique.

Case Histories

Mrs. A. L., age 30, married, one child

The patient complained of marital difficulties and a wayward husband. She had used amphetamine, etc. for her obesity problem without success. The above technique was used with an addition of material on sexual reeducation. On the first visit, June 1951, the patient's weight was 174 lbs. Subsequent yearly decreases in weight follow:

June 1952 – wt. 142 lbs.
June 1953 – wt. 138 lbs.
June 1954 – wt. 136 lbs.

Mrs. M. F., age 41, married, three children

The patient had seen several physicians in regard to her obesity, used dextro-amphetamine, thyroid, to no avail. Concommitant with her increasing weight was a chronic cough and hoarseness of two years duration. A thorough investigation revealed no pathology of throat. The technique similar to above was used with additional emphasis on normalcy of throat, etc. The hoarseness and cough disappeared after three weeks of therapy, and have never reappeared except on one occasion when an upper respiratory infection was found. Routine treatment cleared this in several days. On the first visit in September, 1952, the patient's weight was 207 lbs. Yearly decreases in weight follow:

September 1953 – wt. 172 lbs.
September 1954 – wt. 156 lbs.

Mrs. D. D., age 26, married four years, no children

In addition to her obesity problem, the patient complained of a sterility problem. Thorough investigation revealed no abnormalities of organic origin. The usual routine was used combined with advice to discontinue "trying to become pregnant." On the first visit in June 1953, the patient's weight was 250 lbs. In August 1953, she reported a menstrual period missed. Her weight on this visit was 239 lbs. Pregnancy was verified in September, the patient's weight at 221 lbs. A normal female child was delivered in May 1954 by the patient weighing 175 lbs. By October, 1954, her weight was 163 lbs. (This weight was approximately correct for the patient who is 5'10" tall and of broad bone structure.)

Miss F. M., age 29, single

In discussion of her obesity problem, the patient disclosed a feeling of inadequacy, "not wanted or desired." This information was used in the therapy with excellent results. On the first visit, January 1950, the patient weighed 265 lbs. Her subsequent visits are recorded below with her weight at the time of visit.

March 1950 – wt. 233 lbs.
May 1950 – wt. 218 lbs.
September 1950 – wt. 208 lbs.
September 1951 – wt. 213 lbs.
September 1952 – wt. 198 lbs.
September 1953 – wt. 186 lbs.
September 1954 – wt. 180 lbs.

Conclusion

The author has described a simple technique using Psycho-Biologic technique in conjunction with Hypnotic procedures, the combination of which can be easily altered to fit many obesity problems which are resistant to the usual drug-diet prescription.

The easier acceptance of the therapy in the hypnotic state cannot be too strongly emphasized. As Wolberg notes, hypnosis is an effective means of abetting Psycho-Biologic therapy. Guidance, reassurance, persuasion, reeducation, and reconditioning are markedly increased in amount of response of the patient in the hypnotic state. (1)

By the use of hypnosis, rapport is established more quickly and easily, and the feeling of participation on the part of the patient convinces him that the therapy will be successful.

The above procedure can be readily learned by any physician treating obesity who desires to afford his patient long standing relief.

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Autosuggestive Active Tonus Regulation as an Aid in Hypnosis Therapy

B. Stokvis

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In every suggestive therapy the factor of repetition is an important element; when a patient takes his medicine a given number of times per day, he "introjects" the same number of times. It would be desirable if, also in the method of verbal hypnosis, introjection could be effected several times a day. As a rule this is not possible, for social reasons; but by way of a substitute we have, since 1937, used the technique of active tonus regulation, which shows some resemblance to the exercise therapy recommended by Kretschmer and his school: "Fraktionierte Aktiv-Hypnose."

We ourselves proceed as follows. The patient is told that the doctor cannot be expected to effect a cure all by himself but needs the full co-operation of the patient during the treatment. This, moreover, flatters the patient's narcissistic feelings: he no longer feels a merely passive object, but is stimulated in taking an active part in the therapy. But in addition this encouragement appeals to his sense of responsibility; in other words he is made partly responsible for the eventual course of the curative process. The patient should enhance the influence of the suggestions put to him in the hypnotic state, by isolating himself every day at the same time – preferably at the time of the first session with the physician. He must lie down on a couch, systematically relax his muscles and concentrate intensively for five or ten minutes on the words spoken to him by the doctor during the previous session; and repeat the suggestion put to him word for word. Here again, repetition may serve to reinforce the influence of the suggestion. This autosuggestive exercise should also be done in the morning before rising, and in the evening after retiring to bed. By this training it is attempted to obtain a resonance of the deeper strata of the personality, thereby enabling the regulation centres in the diencephalon to effect beneficial changes in the vegetative nervous system.

Analytically viewed, the strict instructions of the doctor tend to satisfy the neurotic feeling of guilt and the need for punishment on the part of the patient. The severe instruction to ingest a few drops of tinctura asae foetidae immediately before the exercise, has a similar psychologically punitive effect.

In patients inclined to hypochondriac self-observation there is a danger that the practice of this autosuggestive exercise may lead them to pay undue attention to themselves.

The simplistic method described above may form a welcome opportunity for the patient to co-operate personally in his recovery. It may not only, in the initial stages, support the hypnotic treatment, but even make it superfluous in the long run: the hetero-erotic bond with the hypnotist has then been replaced by the auto-erotic bond between the patient's Ego and Self. It may happen that, when the hypnotic treatment has finished, the trans-

ference situation changes, and increasing resistance on the part of the patient causes a return of neurotic symptoms. In some cases the use of the autosuggestion exercises during and after the hypnotic treatment may prevent their recurrence. The performance of these exercises forces the patient to divide his libidinous energy between the hypnotist and the Self; the shock after the cessation of the hypno-therapy will thereby be mitigated. Nevertheless the patient will feel frustrated, so that the possibility of a relapse remains, as is, after all, the case with the application of all covering psychotherapeutic methods.

What we have called autosuggestive active tonus regulation constitutes a useful aid to hypnosis therapy. As the treatment proceeds, the exercises may assume the nature of autohypnosis – maybe in the way described by I. H. Schultz in his "Autogenous Training," with all its attendant advantages.

Two more questions arise with respect to this exercise therapy. In the first place, does the patient experience the fact that it is he who does the exercises himself, as a dimming of the halo with which he has illuminated his doctor? One might well ask oneself this question when giving a (sober-minded) patient an introductory explanation to the effect that the hypnotic treatment actually means that he hypnotizes himself; for one thereby also removes the nimbus from the hypnosis therapy, and, with that, from the physician. But this need not be feared: even if the hypnotized person (say, a doctor or medical student) is familiar with the hypnotic process, he will allow himself no less readily to be "charmed" by the hypnotist; after all, every human being has, in his heart of hearts, the latent inclination to surrender to the miraculous!

The second question is: until when should the patient continue doing the exercises? Here, too, there need be no difficulty; as a rule, his initial interest will gradually decline; except in the case of a small percentage of patients with a compulsive character structure, the performance of the exercises begins to slow down and weaken soon after the termination of the treatment by the physician. It is advisable, if patients question the psychotherapist on this point, to keep instructions somewhat on the vague side.

Conclusion

As may be clear from the above exposition, the use of autosuggestive exercises for the purpose of active tonus regulation is a welcome aid to hypnotherapy; not only in strengthening the suggestive-autosuggestive influence of the hypnotist, but especially in emphasizing the active share to be taken by the patient in ensuring the success of the hypnotic therapy.

Summary

On the basis of the principle that in every suggestive therapy the factor of repetition in an important element, the author proposes to get the patient to do autosuggestive exercises, by which the muscular tonus can be regulated (relaxation).

The psychological significance and practical application of this procedure are discussed in detail.

Self-Hypnosis in Childbirth: A Clinical Evaluation of a Patient Conditioning Program

MILTON V. KLINE[1] AND HENRY GUZE[2]
Long Island University

The use of hypnosis in obstetrics has shown a steady increase both in clinical utilization and scientific recognition.

Modern obstetrics has followed the course of modern medicine, passing through the distinct phases of bacteriology and chemistry. It is presently, like the whole field of medicine, entering the era of psychology.

The traumatic implications of childbearing and the accompanying fears and bodily tensions, albeit long recognized have received often too little attention at the hands of the busy and overburdened clinician. Recognition of pain reduction as advantageous in the delivery itself reached a new level in the early decades of the twentieth century with the increasing popularity of "twilight sleep" induced by hyoscin or scopalamine (12). Indeed Williams (13) and others at this time dared to challenge the ancient edict: "In sorrow thou shalt bring forth children."

The use of hypnosis as a means of gradually preparing the patient for the experience of childbearing, despite its early promise, was overshadowed in an age of increasing drug utilization. It remained for Grantley Dick Read (9) to lead a new movement toward the recognition of the fact that childbirth could be a relatively comfortable process in a patient trained in relaxation who could enter labor with a minimum of fear. Read's method in various forms was adopted by practitioners in the United States. Finally, Thoms (11) at Yale directed a program in training for childbirth. While the latter has claimed, as did Read himself, that hypnosis or suggestion therapy were not involved in the results, this concept can most certainly be challenged. For example, Mandy, Mandy, Farkas, and Scher (5) emphasize the identity of the Read technique and hypnosis.

There is little question as to the remarkable effectiveness of hypnosis in obstetrics. Several outstanding obstetricians, Abramson (1) and Kroger (3), for example, have in recent times used hypnosis in the birth process. As Kroger (4) points out: "The hypnoidal state is a safe amnesic, analgesic, and anesthetic agent. There are no untoward effects on the mother or baby ..." Abramson and Heron, a psychologist (1), more conservatively recognize that not all cases give the spectacular picture of deep hypnosis. They say, and correctly: "But we do not have to seek only these outstanding cases in order to establish appreciable benefits from prenatal hypnotic training."

For the greater part, hypnosis in obstetrics has been employed in a heterohypnotic relationship, with the hypnotist assuming direct responsibility and procedure for bringing about those emotional and physiological conditions most conducive to painless and efficient childbirth. In many instances, the

[1]Institute for Research
[2]Psychology Department

obstetrician himself has employed hypnosis with his patient, starting early in the program and carrying through to delivery. In other instances, the obstetrician has utilized another person as the hypnotist, either a psychologist or physician specially trained in hypnosis.

Little formal attention and study has been given to self-hypnosis as a training or conditioning procedure in obstetrics. Schneck (10) reports upon the use of self- hypnosis in an obstetric case and in evaluating the results as well as the procedure emphasizes the potential utility of such a program. Newbold (6, 7, 8) places strong emphasis upon such a form of pre-natal training and indicates an outline for such a program.

During the past two years, the authors have utilized a self-hypnosis training program with selected obstetrical patients.[1] A reasonably large number of patients have been seen and their progress through delivery evaluated. It is the purpose of this paper to briefly present an outline of the administrative procedure utilized and a statistical evaluation of the nature of the hypnotic effects and conditions achieved. Such a report for a self-hypnotic obstetrical program has not as yet been presented.

Procedure

In general, the self-hypnotic program includes:

1. Psychological evaluation of the patient's capability to utilize hypnosis in the clinical management of childbirth.

2. The use of psychological test techniques to screen out those patients whose emotional adjustment appeared too precarious to warrant undertaking this type of hypnotic training and the clinical evaluation of their response to hypnosis and the hypnotic-relationship with respect to its emotional desirability and its psychophysiological effectiveness.

3. Following selection, individual training in hypnosis, to the point of greatest response and behavior control that was possible, was undertaken.

4. The development through self-direction of techniques of relaxation, muscular and sensory control and emotional equilibrium.

5. The extent of behavior control obtained ranged from relaxation to complete anaesthesia and particular attention was placed upon methods of pain control and anxiety management by the patient herself.

6. In general, patients were seen once a week over an eight week period for an average of 30-40 minutes per session.

Results

Table 1 presents a statistical report of thirty obstetrical patients who were trained to utilize self-hypnosis during their pregnancy and employed it during the delivery. Their age ranged from 20 to 37 with an average age of about 28. The depth of hypnosis obtained is shown by the Davis-Husband

[1]The thirty cases reported upon in this paper represent only the cases seen by one of the writers (MVK).

Scale (2) rating, which while in need of some revision permits a systematic classification of hypnotic depth with respect to its major functional characteristics. The number of training sessions are also reported, as well as the number of patients who utilized drug techniques along with hypnosis. A clinical estimate of comparative dosages of such drugs is also indicated. Tables 1 and 2 show the relationship of hypnotic depth to the utilization of drugs.

Table 1

Statistical Description of Hypnotic Training, Depth and Utilization of Self-Hypnosis Technique for Thirty Obstetrical Patients

Patient	Age	Hypnotic Depth Davis-Husband Scale Rating	No. Hypnotic Training Sessions	Cases in which drugs were used	Clinical Evaluation of Drug Dosage
1	23	6	12	X	0
2	28	15	8	X	–
3	37	18	10		
4	28	18	8		
5	26	25	8		
6	31	15	8		
7	29	11	11	X	0
8	26	10	9		
9	27	6	14	X	+
10	33	15	8		
11	30	15	8		
12	31	15	8		
13	34	11	8	X	0
14	33	6	15	X	0
15	27	11	8		
16	26	25	8		
17	24	18	8		
18	25	11	9		
19	28	15	8		
20	29	6	10	X	0
21	28	11	8	X	–
22	28	6	10	X	–
23	23	11	10		
24	36	10	11	X	–
25	21	15	8		
26	20	25	8		
27	28	6	12	X	0
28	34	6	14		
29	30	11	8	X	–
30	29	6	11	X	–

At the time of delivery, the attending obstetrician evaluated the amount of drug used in relation to "average" ranges in normal cases of childbirth. The following scale was then used to describe these evaluations:

– = less than "average" drug administration
0 = "average" drug administration
+ = "more than average" drug administration

Table 2

Evaluation of Depth of Hypnosis and its Relation to Obstetrical Procedure at Delivery

Davis-Husband Scale Ratings				No Drugs Used	Less than Average Drug Dosage	Average Drug Dosage	More than Average Drug Dosage
0 – 10	11 – 14	15 – 24	25 +				
33.3%	23.4%	33.3%	10%	57%	17%	23%	3%
Complete relaxation and some analgesia	Hypnotic anaesthesia – self-hypnotic in most cases	Complete post-hypnotic anaesthesia as well as control over sense and perceptual modalities	Complete Somnambulism	Obstetrician and patient felt no need for supplementary drugs	Based on clinical evaluation by obstetrician	Based on clinical evaluation by obstetrician	Based on clinical evaluation by obstetrician

For this group of patients an average of 9.5 hypnotic training sessions of approximately 35 minutes were employed. 57% of these patients did not receive any drugs during delivery. Of the 43% who did utilize supplementary drugs at the discretion of their obstetrician, 40% in the opinion of the obstetrician utilized the same or smaller dosages than might usually be administered in a comparable non-hypnotic delivery. Only one case required greater drug administration than would usually be necessary. 17% used smaller than "average" drug dosages.

33% of the patients achieved a level of hypnosis capable of producing complete relaxation and varying degrees of analgesia. Anesthetic reactions were spotty in this group and not consistent either in hetero or self-hypnosis. This was the group of patients in the "lighter" stage of hypnosis ranging on the Davis-Husband Scale from 0-10. All patients in this group were capable of at least complete relaxation and virtually all achieved some degree of analgesia.

A depth of hypnosis ranging from 11-14 on the Davis-Husband Scale was attained by 25.4% of the patient group. All patients in this group were able to obtain a clinically complete anaesthesia both with hetero and self-hypnosis.

33.3% of the patients ranged from 15-24 on the Davis-Husband Scale and were capable of post-hypnotic anaesthesia as well as partial to complete amnesia. 3 patients of the 30 were somnambules. In sum, 67% of the patients in the entire patient group were capable of achieving some degree of anaesthesia either through hetero-hypnosis, self-hypnosis or post-hypnotic techniques. In some 40%, distinct alterations in perceptual and memory function was possible, permitting more direct management of pain, fear, and muscular control.

Discussion

In appraising the results of this experimental use of self-hypnosis with 30 obstetrical patients it was found that virtually all patients profited to some degree from the hypnotic training. A very large percentage was able to go through childbirth either with no drug techniques or with significantly reduced dosages. Clinical evaluation of the patient's reactions to the delivery and post-delivery periods by the obstetrician indicated that self-hypnosis facilitated the birth process either through an elimination or reduction of drugs and by increasing the patient's response and utilization of those drugs that were employed. More exacting studies of this latter element must be made, since it bears on the general problem of psychopharmacology as well as its function in childbirth.

For the greater part, the obstetricians involved were technically unfamiliar with hypnosis and had not themselves ever employed it. Their reaction to its use was essentially cautious and critical, with some tendency to quickly institute drug techniques at the first sign of pain of any considerable nature. It is likely that with further experience with hypnosis, participating obstetricians will be able to eliminate or cut down drug techniques even beyond the percentages reported here.

It is also likely that with some further intensification of hypnotic induction and conditioning methods, the percentages of "deeper" hypnosis and more extensive pain control can be increased. Observational reports by the obstetricians in this study indicated that they felt most of the patients maintained better emotional control and managed their fears considerably better than "had been expected."

Further research in evaluating emotional as well as psychophysiological adaptations through self hypnosis is needed in order to improve the method of hypnosis in childbirth reported upon here. The results clearly indicate its advantages to the patient and the physician.

Summary

A two year experimental study of the use of self-hypnosis in childbirth has indicated its general effectiveness for virtually all the patients who received this type of pre-natal preparation. Although problems of selecting patients capable of utilizing this method have not been discussed in detail in this paper, it must be understood that this study depended upon a patient population selected on the basis of specific psychological characteristics which were indicative of both the judiciousness and effectiveness of self-hypnosis for obstetrics.

Within the limits set by these selective characteristics, which in themselves may be greatly broadened by further study, self-hypnosis as a means of patient participation in childbirth appears to have very great merit. It is a method that lends itself to simple administration and can be extended to

many more patients than any other hypnotic approach. It minimizes the need of the obstetrician to utilize time and effort in patient conditioning without sacrificing any of the advantages of hetero-hypnotic techniques. Its use on a larger scale than reported upon here, with more exacting investigative techniques, seems clearly indicated.

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The Influence of Hypnosis on the Learning Processes

SOME THEORETICAL CONSIDERATIONS: II. RECALL OF MEANINGFUL MATERIAL

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In a previous paper (20) it was shown that the influence of hypnosis upon retroactive inhibition could be accounted for in terms of Hullian learning principles. Using a similar approach the present paper will examine the situation in the case of the recall of material of varying degrees of "meaningfulness."

A. Review and Discussion of the Experimental Data

Inasmuch as the investigations under consideration have been reviewed elsewhere (21) this paper will limit itself to a tabular summary of the main features of these studies as given in Table I.

As has been remarked previously (20) there is no perfect agreement between the results which have been reported when a detailed point-for-point comparison is made between the various pertinent investigations. Some of the rather obvious possible reasons for the discrepancies were then given. In spite of these limitations, certain rather clear overall trends seem to be present in the available data. These trends are summarized as follows:

(a) There is apparently no difference in waking and hypnotic recall for completely "meaningless" material. This and the next two deductions are the clearest conclusions which can be derived from the data.

(b) The more "meaningful" and/or integrated in a context the material to be recalled is, the better it seems to be recalled in hypnosis as well as in the waking state.

(c) Hypnotic recall for "meaningful" material appears to be superior to waking recall for the same.

(d) Some material to which anxiety is attached would seem to be better recalled in hypnosis than in the waking state.

If, and as will be discussed presently this is a very big "if," one can ascribe to pictorial scenes, events, and objects the possession of either greater "meaningfulness" or of greater "contextual integration" than prose and poetry, the reported data *suggests* that:

(e) The hypnotic advantage in recall (or the percentage gain over waking recall) is probably an increasing function of the "degree of meaningfulness" (or, which comes to the same, of the extent of waking recall) of the memorized material.

As will have been noted, this last statement has been made in rather qualified terms and as a weak assertion. This brings to the fore certain major methodological difficulties encountered in attempting to interpret the results. One of these is the fact that there is no evidence that the initial learn-

INVESTIGATORS	STATE OF SUBJECTS DURING ACQUISITION	STATE OF SUBJECTS DURING PERFORMANCE (recall)	No. SUBJECTS USED	NATURE OF MATERIAL USED	RESULTS
Young (25)	* W (1)	H	22	digit span, nonsense syllables, adjective-noun associations, names, visual associations, remote events	Hypnosis for remote material only
Young (26)	W	H	1	details of a familiar setting.	no hypermnesia
Kyrsek (3)	* W (1)	H	2	nonsense syllables, digit span, card recognition (three different tests with this)	no hypermnesia
Gray (5)	H	W (1)	6	words	slight hypermnesia
Stalnaker and Riddle (18)	W	H	12	prose	53.7 % hypermnesia
Huse (7)	W	H	8	paired nonsense associates	no hypermnesia
White, Fox, and Harris (23)	W	H	8	paired nonsense associates, prose, moving picture scenes	no hypermnesia for nonsense material 53.1 % hypermnesia for prose 83.1 % hypermnesia for movie scenes
Rosenthal (15)	W	H	13	nonsense syllables, words mixed with nonsense syllables, words + nonsense syllables with success-failure incentive, poetry, poetry with success-failure incentive, profane and innocuous words, tasks performed under success-failure incentive	no hypermnesia for nonsense material, mixed nonsense syllables and words, poetry with success-failure, and innocuous and profane words. hypermnesia for failed words when success-failure incentive used in the nonsense syllable and word mixture, for poetry, and for failed tasks
Sears (16)	W	H	24	groups of specific objects	Hypothesis that waking and hypnotic recall are not different rejected

TABLE I

* It is not entirely clear to the writer from Young's writings whether acquisition was in the waking or the hypnotic state. It is the writer's impression that the former was the case. Since Kyrsek only states that he followed Young's procedure his report is ambiguous in this respect too. Attempts to obtain additional information on this matter have been thus far without success.

ing is equated between the various tasks involved in these studies. Another is that if we are to study the effect of "meaningfulness" upon learning, whether it be in hypnosis or waking, we must be able to equate and rank items for "meaningfulness," even if only a dichotomy results from this. Furthermore, we must be able to equate the items on all characteristics which are involved in learning and recall, other than "meaningfulness." Unfortunately, the quantification of items on "meaningfulness" is anything but satisfactory here. Thus we cannot be certain, for instance, that memory

span for digits falls in the same category as memory for nonsense material. And what of recognition of cards? Playing cards such as those used by Eysenck might be expected to have more "meaningfulness" than nonsense material—but have they? In this particular instance there is a further complication for as the writer has shown (22) in the case of the recognition of patterns on the reverse side of cards the effects of hypnosis upon the perceptual functions may be more important than its effects on memory itself in determining the final results. Another problem that arises here is concerned with the evaluation of results based upon the comparison of recall for words, numbers, and the like, on the one hand, and of recall for scenes and past events on the other hand. Any normal individual can be asked to reproduce from memory a memorized passage, a list of words, and so forth; but only an artist could do the same for memorized scenes. Even were this possible in all instances, there would still be a major problem in scoring anything less than perfect reproduction.[1]

Probably the most basic difficulty encountered here is the fact that the notion of "meaningfulness" which seems to play such a central part in most of these studies is anything but clearly defined. What are the properties or aspects of a stimulus which give it "meaning"? How is this "meaning" to be measured? These are questions which must be answered before a full appraisal of the reported data can be made. Such results as have been reported by White et al. and by Rosenthal may be very misleading for lack of an adequate measure of "meaningfulness," not to mention an adequate definition. The last inference (e) from the data listed earlier demonstrates well this problem. It was based upon the assumption that in order of increasing "meaningfulness" one can list nonsense syllables, prose and poetry, and past life experiences and scenes from movies. This seems at first a reasonable assumption. Actually, it is probably a considerable oversimplification of the true state of affairs. I have some rather strong doubts that all of these items lie on a single common continuum of "meaningfulness." This thought may have been at the back of the statement some of the investigators mentioned earlier made, when they remarked that it is the "meaningfulness" and the "degree of 'integration in context' " which determines the extent of hypnotic hypermnesia. Unfortunately they fail to elucidate what these notions refer to, and to show how they might or might not be interrelated. That "meaningfulness" may involve more than one dimension is implied in Katona's (8) distinction between the "meaningfulness of content" and the "meaningfulness of connections" which seems rather pertinent to the present discussion. Further support for such a view can be found in Sheffield's doctoral dissertation (17).

Still another complication arises in the fact that there is a possibility that affect associated with learned items gives rise to an additional "dimension" of "meaning" which influences recall. Other uncontrolled factors which may affect recall in these studies include incentive and aspiration levels.

[1]To be noted that the criterion of perfect recall used by White et al. is quite inadequate. They chose to score perfect recall if the investigators could recognize the scene from the subject's description of it from memory. It hardly seems necessary to discuss the difficulties inherent in such a method of scoring recall. The scoring system used by Sears in his investigation comes much closer to what is needed here.

B. Theoretical Considerations and Interpretations

If the reader re-examines Table I it will be noticed that hypnosis was primarily used to affect recall in contrast to learning per se.[2] This is certainly true of the last five studies which have been listed. Because of the ambiguity which we have noted in regard to the remaining investigations, the bulk of this discussion will be limited to the above mentioned five investigations, that is, to the problem of recall under hypnosis, as indicated in the title.

In regard to recall and hypnosis we shall be concerned with two aspects: (1) the effects of hypnosis upon recall. As we have seen, if any effect at all takes place, it appears to consist of an enhancement. (2) The relative increment in recall associated with hypnosis for different tasks or material. Again as was seen, it appears such increments might be a positive monotonic function of the degree of "meaningfulness."

In general, deacquisition can take one of three forms. The associations created by the learning process (or the enhancement) become progressively weaker with time, through "disuse." This hypothesis has been pretty well rejected by learning theorists and will be of no further concern to us. Another process consists of an irreversible destruction with or without the accompanying substitution of other associations (or enhancement of other responses), as in Guthrie's contiguity theory. Lastly, various types of interferences (inhibition, suppression, competition, etc.) may partially or completely prevent the associations (or enhancement) from temporarily manifesting themselves. This approach has been typical of Hull and his students, and has been the one found most useful in understanding the action of hypnosis on recall.

Quite apart from any process of deacquisition or acquisition, Hull (6) has pointed out that recall would depend upon the momentary strength with which a stimulus can evoke a response, that is, upon its "momentary effective" reaction potential. The latter is a relatively complex function of a number of factors, and in particular, it is a linear function of the excitatory or reaction potential sEr of the stimulus, being proportional to it. This quantity is proportional to a number of factors, two of which are of some interest to us, namely, "stimulus dynamism," V, and "drive strength, D.[3] All other things being the same, we would not expect hypnosis to alter the values of either V or sHr. On the other hand, drive strength could

[2]For our purposes we will take Underwood's (19) definition of learning: "Learning is the acquisition of new responses or the enhanced execution of old ones." In contrast, "recall" is concerned with the *persistence* of previously acquired responses or enhancement of responses over a time interval. During any time interval deacquisition may take place reversibly or irreversibly. The process or processes which are involved are not necessarily the converse of the acquisition processes, in fact need not bear any resemblance or relation to these. Thus, conditions affecting learning are not necessarily expected to affect recall. On the other hand, it must be kept in mind that recall presupposes a prior learning stage and that because of this certain relations must of necessity hold between the two.

[3]Hull states that sEr = C x D x V x sHr, where C is a factor equal to the product of all other terms not explicitly stated here, V is the stimulus dynamism, that is, a measure of the effect of stimulus intensity, and sHr is the habit strength, that is, a measure of the degree or prior learning.

conceivably be increased by the hypnotic situation, especially if the subject was given suggestions of superior performance or of greater incentive. It is also possible that hypnotized subjects are naturally more motivated than waking subjects. In any event, whatever the cause for an increase in D, the net effect would be an increase in sEr, hence in recall.[4]

The trouble with this explanation is that according to it, hypnosis should enhance the recall of both "meaningless" and "meaningful" material. This is contrary to the findings. Conceivably, "meaningfulness" gives greater dynamism to the stimulus, or again, it is possible that individuals are more motivated to perform a "meaningful" task than a "meaningless" one. This last could account for the fact that "meaningful" material is better learned and recalled than "meaningless" material. However, by itself it does not explain why the difference in recall for the two kinds of materials is greater in hypnosis than in the waking state.[5] Furthermore, we would theoretically still expect some improvement in the recall of "meaningless" material when hypnosis is used, which does not occur. A somewhat better solution is obtained by combining the above explanation with the previous one. This, however, results in a rather weak theory which has as one of its major failings the fact that it has to fall back upon assumptions such as the one that greater stimulus dynamism is associated with greater "meaningfulness," or that hypnosis increases motivation. We might hope to at least be able to find something more substantial in the line of theory.[6] Does sEr possess other properties than the one just used? It does.

This quantity and its derivatives have additive and subtractive prop-

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[4]A rather trivial but possible explanation of the hypnotic enhancement of recall is that hypnosis allows the subject to concentrate more fully upon the task and hence eliminates various external and internal interfering stimuli. This writer is rather dubious that this is the correct explanation, or even a partial one, except maybe in some particular cases. Some of the difficulties inherent in such an explanation will become clear as we proceed with the above.

[5]A rather trivial explanation for this might be as follows. We know that "meaningful" material is better recalled in the waking state than is nonsense material. We might assume that the difference in recall results from the association with "meaningful" material of an addiional process specific to it. If hypnosis should affect the processes common to the two kinds of material and the specific one in the same direction, we would expect that hypnosis would cause additional enhancement for "meaningful" material.

[6]Why then bother with these unsatisfactory explanations? There are at least four reasons for doing so. First of all, anyone familiar with Hullian theory would first look in this direction for a possible explanation. It behooved us to examine their implications for the present material. Second, our main purpose in this series of papers is to demonstrate that one does not need to invest hypnosis with extraordinary properties to account for its effects, but that on the contrary, the explanation can be found in terms of ordinary waking phenomena. This is not a denial of the possibility that hypnosis has "supranormal" properties, and that these come into effect. This may very well be the case indeed. But we do want to show that one does not need to make use of such a concept. A third reason is that such effects as have been considered may very well take place in some or all instances and add their influence to that of other processes. In other words, they represent possible influences which contribute to the "over-determination," to use a term introduced by Freud, of recall in hypnosis and hence cannot be rightly ignored. Finally, there is a certain value in doing this sort of thing for the questions it raises regarding our very understanding of normal, waking phenomena. Consider for instance the notion of "stimulus dynamism." In the case of an auditory stimulus or of a pain stimulus, it is clearly a function of physical stimulus intensity, although already with pain, one may wonder whether something more than intensity is not being involved. When we come to verbal material, nonsensical and "meaningful," we may well ask what does "stimulus dynamism" mean for these? This writer does not think the answer is quite so obvious.

erties. It is therefore also possible to alter sEr by adding or subtracting increments to and from it, thus again altering recall. Psychophysiologically speaking, two of the counterparts of these mathematical operations are respectively interference and stimulus compounding.[7] Inasmuch as interference is considered by many to be responsible for low recall, a logical line of approach to the present problem would seem to be in such terms.

We have already touched upon the problem of interference in Part I (20) where it was shown that the use of Hull's concept of stimulus generalization gradients leads to a model which accounts for the reported effects of hypnosis on retroactive inhibition.[8] This model is of a much more general application, holding for any instance in which generalization gradients interact. It would only be logical to extend the principles involved in this model to the present problem. There is, however, a better reason for doing so. For if the model is anywhere near correct, that is, if it is isomorphic with psychophysical reality, its underlying principles should be capable of handling situations other than the one for which it was initially developed.

Such an application of the model as is being proposed here cannot, however, be done unless we can introduce "meaningfulness" into the picture, either as a new variable, or in terms of already existing variables. This means essentially that before we can go ahead we must have available an

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[7]Attention might be called here to a methodological problem which is too often ignored. In a situation like the present one, it is not permissible to arbitrarily define addition and subtraction, or any other operation for a quantity such as sEr unless there exists a psychophysiological counterpart of these operations (23). Although we began by stating that the reaction potential has additive and subtractive properties, this was allowable only because it already was known to the writer that interference and compounding define these two, operations at the psychophysiological level. It should also be noted that the rules of addition and subtraction for sEr are not the same as those which apply to numerical quantities. For this reason, Hull (6) used in reference to compounding the term "behavioral addition" and the special symbol $\dotplus$ for it. To follow suit, the writer would like to propose that one also speak of "behavioral subtraction" and use the symbol $\dot{-}$ for it. According to Hull the *numerical* value associated with the behavioral sum of N reaction potentials is given by the formula:

$$\left|{}_{ss}E_r\right| = \Sigma_1 - \frac{\Sigma_2}{M} + \frac{\Sigma_3}{M^2} - \cdots + (-1)^{n-1}\frac{\Sigma_n}{M^{n-1}}$$

where Σ_1 is the *arithmetical* sum of the *numerical* values associated with each component reaction potential; Σ_2 is the arithmetical sum of the arithmetical products of all combinations of numerical values taken in pairs; and more generally, Σ_M is the arithmetical sum of the products of all combinations of numerical values taken N at a time. The use of parallel bars, $|\ |$, to inclose a qualtity denotes that its numerical value alone is being considered. Hull did not derive a formula for behavioral subtraction. To do this, however, is a relatively simple matter using statistical behavioristics. One can show that the formula which hold is:

$$\left|(sE_r)_1 \dot{-} (sE_r)_2\right| = \left|(sE_r)_1 - \frac{\left|(sE_r)_1\right| \times \left|(sE_r)_2\right|}{M}\right|$$

Just as the formula for addition shows that the magnitude of the behavioral sum is always less than the arithmetical sum of the component magnitudes, we find from the above that the magnitude of the behavioral difference is always greater than the arithmetical difference of the component magnitudes. For a full understanding of these formulas, it is important to note that they assume in their derivation that all responses are *all-or-none* effects. Also, in this scheme the strength of response becomes a statistical entity [Hull (6), p. 304f].

adequate theory of "meaning," one which can be expressed in terms of the variables already used.

Ebbinghaus (2) was one of the first to attempt to define "meaning" in the context of learning theory. He suggested that it was an individual's previous familiarity with the material in question. Since then, a number of investigators have concerned themselves with this problem. McGeogh (10) felt that meaning is a special form of transfer, a view which probably relates to that of Ebbinghaus. Koffka (9), on the other hand, believed that structured and differentiated material was meaningful, whereas unstructured and undifferentiated material lacks meaningfulness. Making use of Hull's principle of generalization, Gibson (4) has related conditioning theory to this view, making meaningfulness a function of discrimination between stimuli. Sheffield (17) has a somewhat similar theory, although he goes a step further in suggesting that there is more than one kind of meaning. However, in-so-far as learning and recall are concerned, he agrees with Gibson in the final analysis. In recent times Nobles (13) has proposed that the particular meaning of a stimulus be identified with the number of habit strengths which subsist between the stimulus and all the responses which have become associated with it at some time or other. Finally, Osgood (14) has formulated a theory of meaning which resembles Noble's rather closely and which may eventually be shown to be essentially equivalent to it. However, for our present purpose this point is not particularly relevant and will concern us no further. Since we shall make rather extensive use of Osgood's theory later, we will only mention for the time being that the nucleus of the theory is what Osgood calls the "mediation hypothesis," and leave the elucidation of this matter to subsequent pages.

Obviously there is no lack of theory. None of the above, however, seems able to account satisfactorily for *all* of the reported effects of hypnosis upon recall[9]. Fortunately they do not exhaust all possible attacks upon the question and the material which follows is based upon an alternate theory of "meaning" which the writer has been developing for some time now. Although it is not yet in its final formulation, it has been developed sufficiently

[8]In brief review and for those who have not read Part I, the model presented in it is as follows. Every stimulus lies on a continuum of functional similarity which it shares with various other stimuli. Whenever such a stimulus becomes associated with a given response, all of the other stimuli which lie within a certain range upon the similarity continuum possess, by virtue of this position effect, the capacity to also evoke the response. The force with which this is done decreases with increase in the distance on the similarity axis of these non-adequate or *secondary* stimuli from the adequate of *principal* stimulus. This property is expressed by the notion of the *stimulus generalization gradient*. Whenever two similar stimuli are associated with different and incompatible responses, presentation of either stimulus tends to evoke the two responses together, the adequate response being the stronger of the two. Since they are incompatible they tend to interfere with each other with the net effect that the adequate response is weakened. It is postulated in Part I that hypnosis has the property of decreasing the similarity of two stimuli under certain conditions, thus reducing the interference. This will be called the *hypnotic stimulus shift effect*.

[9]Not to mention their respective inadequacies with regard to waking phenomena[10]. This is even true of Osgood's theory. Although, as will be seen shortly, the latter forms the starting point for the theory to be developed in these pages, without an extension of Osgood's ideas these cannot directly account for certain effects to be discussed.

far to throw some light upon the present problem.[10]

In approaching a topic such as "meaning" and "meaningfulness"[11] one has nearly always the choice of arbitrarily defining this concept without regard to usage; or conversely, one may seek to abstract the definition from the various situations in which it is said to occur. When this last is done in connection with "meaning" there results a set of non-equivalent definitions. That is, "meaning" appears to be used in a number of ways which are not reducible to one another. This suggests that it may be a *multidimensional* rather than a unidimensional entity. The recognition of this possibility is of crucial importance for our understanding of phenomena involving "meaning" or its derivatives. The method used in arriving at such a set of "dimensions" is nothing more than a relatively coarse factor analysis by inspection. It is a well known fact that different methods of factoring lead to different sets of factors. This is also essentially true of the present approach. For instance, Sheffield (17) has arrived at one set, whereas the author's approach seems to lead to another set involving at least four, and possibly six dimensions which are quite different from those defined by Sheffield. As it turns out, the main effect of meaning upon recall as related to hypnosis appears to be largely contributed by only one of these dimensions, called "referential meaning," and it is proposed to therefore devote most of the remainder of this paper to this one aspect.

As already implied, our starting point will be Osgood's *mediation hypothesis.* To state very briefly his position, the following will be said. According to Osgood, certain stimuli come to be connected, through a process of association,[12] to certain reactions originally elicited by a given stimulus-object. These reactions may, however, also occur in the absence of these stimuli. Osgood calls them "detachable reactions" and the stimuli in question now each becomes a "sign" for the stimulus-object. Among the possible detachable responses are those Hull (6) called "pure stimulus acts"

[10]Limitation in space as well as of the scope in topic do not allow more than a much abreviated and cursory exposition of some of the basic ideas which make up this theory. Even a discussion of the strengths and weaknesses of the theories which have been rejected would take us too far afield. In addition, the writer's own analysis and treatment of the problem of "meaning" involves relatively intricate mathematical manipulations the details of which are of primary interest only to the specialist, hence their introduction into a paper such as the present one hardly seems warranted. To leave out such basic material can only be done at the cost of seemingly being dogmatic in the presentation of the material. The writer has done this only of necessity and hopes the readers will bear with him. Before leaving this note it might be remarked that one of the major failings of past theories of "meaning" seems to lie in their oversimplified view of this notion, the consequence being the production of too elementary models. In turn this failure has probably resulted largely from the fact that the necessary tools for symbolic manipulation have not been readily accessible to psychological investigators. It is the writer's belief that nothing less than the use of the mathematical properties of certain topological manifolds will lead to the eventual general solution of the problem of "meaning" in relation to learning. The author's current research on this question is definitely pointing in this direction. It is also of some interest to note that a concurrent line of approach has led to dealing directly with Markoff processes, showing a clear relation exists between the problem of "meaningfulness" of stimuli and information theory, a fact already anticipated in a certain sense by Miller and Selfridge (12).

[11]These terms will be used interchangeably.

[12]It is not material at this point what the nature of the "associations" actually is. Presumably they consist of changes at the neural level, possibly in synaptic resistance, in the form of end-knob growth, etc. . . .

and what Miller and Dollard (11) call "cue producing responses." For these, Osgood uses the term "mediating reactions." Whatever we may call them, these responses are a source of self-stimulation, and it is the pattern of this self-stimulation which, according to Osgood, constitutes the "meaning" of the sign (Fig. 1a) *. Presumably, the more of these mediating reactions are available, the more "meaning" a sign has.

Although there may be a question whether this is all there is to "meaning," as will be seen presently the proposal has its merits. As a matter of fact, it will now be proposed that the above defines one of the dimensions of "meaning," one which the writer has called " (mediatory) referential meaning." To apply Osgood's hypothesis to our present problem is a rather simple matter, if we ask what happens when a sign is connected through learning to a response. We would expect not only that a direct of immediate association would occur between the sign and the response, but also that associations would take place between the said response and *each* implicit stimulus which is evoked (Fig. 1b), for it is generally agreed that a cue-producing response has all of the properties of stimuli in general.†

But if one examines the right hand half of Fig. 1b, redrawn in Fig 1c, one notes that it constitutes nothing else than what Hull (6) calls a compound conditioning situation[13]. As was pointed out earlier, the net reaction potential for such a compounding will be greater than or equal[14] to any single component or combinations of less than the total number N of components. In other words, the more mediating reactions there are, hence the greater the "meaning," the greater will be the strength of the R evoked by S. In terms of recall, this means a proportionally greater recall.

This last statement needs a qualification. It will be noted that there is a left hand half in the diagram of Fig. 1b, redrawn in Fig. 1d. Little as yet has been said about it, but now we must ask how it affects the reaction potential of the over all association S-R.‡ If all the intermediate associations of type S-r are mutually compatible, then all other things being equal, the net or effective potential ${}_{S}{}^{E}{}_{R}$ will result from compounding the product ${}_{S}{}^{E}{}_{r}$ **X** ${}_{s}{}^{E}{}_{R}$

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*All figures referred to in this paper may be obtained by direct request from Dr. Weitzenhoffer, Psychology Dept., University of Michigan, Ann Arbor, Mich. They have been deleted from the Journal in order to conserve space.

† That is, a stimulus S acting as a sign, not only is connected to a response R by a direct association, but also becomes *multiply* linked to it by a group of connections of type S—r-s—R, where in the most general case the simple link —s-r— is replaced by a chain of the same (v. f.n. 15).

[13]For the above gives rise to a situation in which, although only one stimulus initially acts, the end result is of a single response being *simultaneously* evoked by one or more (mediating) internal stimuli and an external stimulus. Lest the word "conditioning" in the above lead to some confusion, it may be well to recall here that conditioning and instrumental learning are basically not distinct for Hull.

[14]The reason why the sum can be equal to its part here is because ${}_{S}{}^{H}{}_{R}$, the habit strength, from which ${}_{S}{}^{E}{}_{R}$ is derived has an asymptotic limit, M, which is the same in all situations. The properties of behavioral addition (and of behavioral multiplication) are such that if ${}_{S}{}^{H}{}_{R}$ or ${}_{S}{}^{E}{}_{R}$ have their maximum value, the addition of any positive increment will not change their value.

‡ That is, we have considered what occurs at the -s—R level of the mediated association. Now we consider the S—r- level.

for each mediating sequence[15]. What we have just said above regarding recall and "meaning" will still hold[16]. If incompatibility exists between some of the component mediating responses, interference will take place and the net reaction potential will be weakened in comparison to the case where full compatibility exists. Osgood himself has never made it clear whether or not the mediating reactions are to be assumed as all mutually compatible. It is the writer's belief that Osgood does intend this last to be the case. In any events, if one understands when we speak of the "meaning" of a stimulus that we refer to its actual "meaning" of *the moment,* and not to its optimal "meaning," then one can assert that all acting mediating responses of that moment are mutually compatible[17]. Such an assumption is not an absolute necessity, but it helps considerably to simplify the presentation of the material of this article.

To sum up the matter thus far presented, it may be said that, within certain limitations inherent in the present treatment, the model shown in Fig. 1b predicts the well-known fact that learning and recall are superior for "meaningfull" material as compared to that for nonsense material. Now, generally speaking, any stimulus S lies on a continuum of functional similarity[19] and consequently tends to evoke not only the specifically learned adequate response R, but also, through generalization, a number of other responses R', R", etc. Assuming such responses are incompatible with R, interference insues. In the present model, which involves only single link mediating sequences, the interference could arise at three levels: there could be an in-

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[15]Any situation such as S $-r_1$-s_1-r_2-$s_2-\ldots-rx$-$sx-\ldots-rn$-$sn-$R will be called a *simple chain* or *sequence* and any part of it such as sx-rx will be a *link*. It can be shown that for such a chain there is an effective reaction potential given by the *behavioral product,* x, of the reaction potentials associated with each link. This product denoted by ${}_{PS}E_R$ is equal to:

$$|{}_{PS}E_R| = \left[|{}_{S}E_{r_1}| \times |{}_{s_1}E_{r_2}| \times \ldots \times |{}_{s_{n-1}}E_{r_n}| \times |{}_{s_n}E_R|\right] / \dot{M}^{n-1}$$

Simple chains of this type have an important property subsummed under what may be called the Position Theorem: Namely, if anywhere in the chain an additional reaction arises which competes with any of the linking responses or with the end response, its effect upon the net reaction potential for the entire chain is independent of its position in the chain. We shall have occasion to apply this principle later.

[16]Because a behavioral product is always less or equal to its components, it is not necessarily true in the model under discussion that greater "meaning" will always lead to greater recall. For this to be so, certain conditions must be satisfied. It is beyond the scope of this paper to take these up and it can only be stated that in the writer's belief these conditions are satisfied in the present problem.

[17]For suppose the totality of N mediating responses associated with a stimulus S consists of two sets of reactions such that *m* of these are mutually compatible, but are incompatible with each of the *N-m* remaining reactions. Hullian theory as well as statistical behavioristics indicate that on any given occasion there will always be a certain number of reactions which dominate all others. The number of these will vary, but it is clear that on all occasions they will constitute a homogeneous group of mutually compatible responses, that is, will belong to one or the other of the two sets.

[19]Including the unit continuum with S for sole member.

teraction with the S-r_x associations, with the s_x-R connections[20], or finally, with the direct S-R association (Fig. 2a). Of course, with longer mediating chains, more points of interference would exist. It is unlikely, however, that appreciable generalization will take place at the s_x-R level[21], and in any case, such generalization as might occur at this level would *not* be expected to be affected by hypnosis in the manner to be soon described. Finally, mathematically speaking, because of the Position Theorem it is always possible to deal with the problem in terms of interactions at the S-r_x level. It can also be shown that the action of interference at the s_x-R level would be to enhance the effects to be taken up shortly. Consequently we may restrict our discussion to interaction at the S-r_x level.

Again, mathematically speaking, Fig. 2a can be simplified to Fig. 2b. What does this situation look like in terms of generalization gradients? It is not feasible to draw the diagram for the case of N mediations, but this can be done for a simpler case, such as the one where N=2, and where, to simplify matters further, it will be assumed that there is only one common gradient interfering with the evocation of the mediating and the immediate responses[22].* This has been done in Fig. 3a where S (W) designates the stimulus (instead of S), and where, for ease of manipulation, the compounded gradients have been arbitrarily given different shapes and sizes[23]. Fig 3b (1) shows the relative magnitudes of the total reaction potential resulting from the compounding of the three gradients, and of the net reaction potential

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[20]In the most general case where S-R is mediated by N mediating single link simple sequences, we can designate any arbitrarily chosen chain as rx-sx, where x = 1,2....n.

[21]Hull (6) has pointed out that in any compounding situation one should expect neural interaction to take place which would both tend to weaken or to strengthen the net response. This is a process of a different order than the one with which we are concerned in these pages. We need not worry about it at this time.

[22]It should be added for those readers who are concerned about the generality of the results to be discussed that what follows can be mathematically demonstrated to hold true for the more complex cases with numerically unspecified numbers of interacting members.

*In the absence of the diagrams referred to, it is recommended that the reader refer back to Fig. I, and particularly, to Fig. IIIa of Part I (20). The main difference between the situation depicted in Fig. IIIa and the present situation is that where only one gradient for the original waking learning is used, now we have to deal with as many additional gradients as there are mediating connections. These gradients need not coincide, but they will all have their maxima occurring at the same position on the abcissa, that is, in line with the position of S [S (W) in Fig. IIIa (20)]. The interfering gradient will still be the dashed gradient of Fig. IIIa, but will, of course, not necessarily have anything to do with interpolated learning. The effect of hypnosis is a shift of S (W) to the left to become S (H). As shown in Fig. IIIa for the single learning gradient, the result is a net decrease in interference, hence a gain in recall. This result will hold true for the contributions of any number of gradients which may be simultaneously activated. If a number of these contribute additively to the evocation of a response, the individual gains for each gradient additively to the evocation of a response, the individual gains for each gradient will "add" up too. Everything else being the same, the more contributing gradients there are, the larger will be the total gain, hence the greater the gain in recall.

[23]The parameters of the gradient curves have been largely taken arbitrarily. On the other hand, the particular shape of these curves is of some importance, for it can be shown that certain relationships must hold between the first derivatives (slopes) of the intersecting curves and that these relationships are not satisfied by all possible families of curves. The present choice of gradient curves has been guided by the work of the Hullian school.

after interference has been taken into account, this latter being segment $D(W)_1$[24].

Suppose now that an individual has learned in the waking state a response R to a meaningful stimulus S with 2 mediating reactions. This situation is the one shown in Fig. 3a where S (W) stands for the stimulus in the waking state. According to the theory of Part I, hypnosis will cause a shift of S (W) to position S (H). As can be seen from Figs. 3a and 3b (2), this causes a greater decrease in the interference than it does in the potentials contributing to the evocation of R. Thus far, there is nothing different here from what was shown in Part I. However, consider Fig. 4a. Here we have assumed there is only one direct association as before, but also there is only one mediating reaction,[25] that is, there is *less* "meaning" attached to S. Again, hypnosis causes a decrease in interference, but as shown in Fig. 4b this decrease is appreciably smaller than that found in the previous case. In fact, if one calculates the percentage decrement in the interference with respect to the waking state for the two cases, it turns out that the case of the more "meaningful" stimulus has a greater percentage decrement. This has been shown by a geometric method in Fig. 5 for our special cases, but the same can be shown to hold true for all cases by means of more general analytical methods. In other words, our model predicts that *the percentage improvement of recall in hypnosis over that in the waking state is greater for material with greater "meaning."* This is not entirely all there is to the above, for it seems a reasonable surmize to expect that the more "meaningful" a stimulus is, in the sense used here, the more it will tend to bear some similarity to other stimuli.[26] In any events it can be shown that the percentage increment in net sER resulting from the hypnotic shift of the principal stimulus is also a positively increasing function of the number of competing responses, hence of the amount of interference existing for each of the principal gradient.[27] With this remark made, we can now consider what happens when the stimulus is perfectly "meaningless." From the above considerations one easily deduces that in this extreme situation the stimulus will have (a) no mediating reactions attached to it, and (b) only through chance will it bear any similarity to other stimuli for which responses will be or have already been well established. The situation we have here reduces thus to one in which there is only the one R gradient.* As can be seen from

[24]The segments used here correspond to the *numerical* sum and difference of the reaction potentials which are involved. Behaviorally speaking, and as pointed out earlier, reaction potentials do not add, subtract, and multiply in the fashion numbers do. Since, however, it appears to have been the convention among such investigators as Hull, Spence, and Gibson, to ignore this fact when using generalization gradients, this paper will follow suit by not making the necessary corrections in the diagrams. As it turns out, the analytical treatment of the problem shows the error thus introduced does not alter the final conclusions.

[25]For purposes of comparison the two sets of figures (3a and 4a) have been aligned and the same gradients used, that is, R and r_1 are the same in both instances, and the same is true for R'.

[26]It might be added that Osgood has shown that it is possible to derive the gradient of generalization in terms of mediating reactions. This fact adds support to the above surmize.

[27]This is essentially a way of stating what the writer has called the Duality Principle of Interference. Actually, what determines the magnitude of the total interference is the total number of intersections between competing gradients and not the number of gradients of one kind or the other.

*Of direct association between S and R.

Fig. 4a by disregarding the r_1 and R^{ℓ}, gradients, the hypnotic similarity shift has for sole effect to actually cause a small decrement in sER. Because of its small magnitude, this decrease will not be expected to show up as a significant difference in the research which has been reported. Thus, the influence of hypnosis would be as reported in the literature. Namely, there is no improvement in recall for nonsense material.

Thus far, we have been concerned primarily with what happens when one learns to associate a stimulus to a response. This is the situation characteristic of paired associates learning. We have seen that the theory predicts that nonsense material would show no improvement in recall under hypnosis, whereas "meaningful" material would show improvement in proportion to the degree of "meaning" present, such improvement being above and beyond any improvement which is normally expected when the learning of "meaningful" and "meaningless" material are compared. However, some of the "meaningful" material which was learned and recalled in the experiments reviewed earlier consisted of prose and poetry. Here is where additional dimensions of meaning enter into the picture. One of these dimensions is inherent in the notion of *context*. Another one is contained in the statistical structure every language possesses. This structure imposes certain learned constraints upon the combinations of letters into words, of words into sentences, and so forth, which may be formed and used in any language. These two dimensions can be shown to effectively strenghten certain associations and weaken others in a direction which always favors the serial learning and recall which is involved in poetry and prose. On the other hand, there are strong reasons for believing that the hypnotic stimulus shift has no effects upon the magnitude of the specific sER contributions of these dimensions, hence we need not concern ourselves any further with these at this point. This last remark also applies to the well-known serial position effect and more generally to the effects of backward and forward associations characteristic of serial learning. This does not mean, however, that serial learning of "meaningful" material will not contribute an additional increment in hypnosis because there are certain gestalt-like aspects of "meaningful" material which may or may not be reducible to S-R analysis and which have not as yet been taken into consideration. For instance, Sheffield (17) has pointed out that the learning of a sequence of terms very likely leads to the creation of a neural representation of the sequence as a unitary whole. This latter constitutes the perceptual counterpart of the sequence and is evoked *in toto* whenever any member of the sequence is allowed to act as a stimulus. In turn, Sheffield suggests, this perceptual response, acting essentially as a mediating reaction, facilitates in feed-back fashion the recall of the other elements of the sequence. This action is above and beyond that due to the various factors already mentioned. It contributes its own amount of reaction potential which compounds with other contributions. This is one level at which the hypnotic stimulus shift might again play a role. Unfortunately there is not sufficient data available regarding this aspect to allow further speculations and the matter must be dropped.

It will be remembered that in some of the studies reviewed earlier some of the data was obtained from the recall of movie scenes, past life incidents,

and of groups of objects previously seen. Recall was appreciably enhanced by hypnosis in all but one of these instances. How much in comparison with the recall of prose and poetry cannot be determined, however, for reasons already taken up. It is quite clear that life events, scenes, objects, and so on, constitute material with varying degree of "meaningfulness," usually probably rather high, and we might expect that the principles examined earlier would apply to some degree here too. But how much must remain an unknown quantity for the time being. Are other factors likely to play a part here? We cannot say for certain as yet, but the recent investigation of Sears (16) might be considered to point in this direction. This investigator required his subjects to recall in the waking and hypnotic states groups of objects to which they had been previously exposed in the waking state. He reports finding superior recall in hypnosis. This is in contradiction of Young's (26) earlier findings. What factors might account for this discrepancy? We do not have to look very far for these. One of the most obvious point of difference in the two studies is that Sears gave his subjects a set to remember the objects prior to exposing them. Furthermore, his experimental procedures called for and insured that the subjects would not only be aware of the objects, but would focus their attention upon these. The exact opposite may be said to characterize Young's procedures. It is quite conceivable that any one or all of these differences in procedure could have selectively affected hypnotic recall.[28] On the other hand we should not jump too quickly at this sort of conclusion because the discrepancy in results may very well be entirely due to the fact that Sears used a scoring system far more sensitive than the one used by Young. Along the same line of thinking, one should mention that Sheffield (17) has remarked that the difficulty of recall is a function, among other things, of the exactness with which the subject is required to duplicate the original material. Whenever the subject is allowed to paraphrase, so-to-speak, this material, and to present this as his solution to the task of recalling, recall is effectively, although spuriously, greatly facilitated. Mediation by the associated perceptual response would play an important part here, and the possibility of the hypnotic stimulus shift adding a recall increment is open. Since, as was remarked earlier, paraphrasing was as a matter of fact the mode of recall used in the above, it may well be that the apparently much superior performance with the material in question can be ascribed to something else than the degree of "meaning" one can associate with it. But here again, the clarification of this point must wait till further data is obtained regarding it.

Another question which comes up here is the role of affect in the recall of varied material in the waking and the hypnotic states. As we saw, some rather ambiguous data was obtained by Rosenthal (15) in this regard. In the present writer's theory of "meaning," affect is associated with one of the dimensions of "meaning," and could rightly be taken up in these pages. On the

[28]It is also possible that the situation reduces to our old friend the effect of "meaningfulness," for it is conceivable that Sears' procedures confer a special additional "meaning" upon the objects, one sufficiently large to lead to a detectable difference in recall. This would not have been the case with Young. It is unfortunate that the waking data from the two studies cannot be compared for a partial check upon this possibility.

other hand, because by its nature affect is quite different from any of the factors considered thus far, the discussion of its role and mechanism of action will be left to a future paper.

C. Discussion

It is clear that the model described and discussed in the previous pages depends for its working upon two sets of premises. One of these concerns the effects of hypnosis upon stimuli. The other has to do with the nature of "meaning" and its effect upon learning and recall. Although space and scope do not allow us to consider in detail all the alternate theories which exist, a few remarks relating to some of these seem in order.

First, a word might be said regarding Gibson's theory of "meaning" because she too has made use of the properties of overlapping generalization gradients to account for the effects of "meaning" upon learning and recall. Those who are familiar with this theory may already have realized that a paradoxical situation exists here. For her use of these properties leads her to seemingly conclude exactly the opposite of the conclusions presented earlier. According to Gibson's theory and arguments, the more "meaningful" a stimulus is, the less it will interact with other stimuli because of "similarity." According to the present theory, the opposite is true. The difference in views are not, however, as irreconciliable as might first seem, because in Osgood's mediation hypothesis we are essentially dealing with a set of mutually *compatible* responses to which Gibson's arguments do not apply. On the other hand, her theory assumes a set of mutually *incompatible* reactions (an essential prerequisite for their mutual interference). Another way of looking at the difference which partly relates to the above point is that in Osgood's theory one is dealing with internal, covert responses; whereas Gibson is primarily concerned with overt or quasi-overt, motor responses. In terms of our model, Gibson seems to be merely concerned with interference at the level of the R responses, whereas we are concerned not only with this too, but especially with interference at the level of the r_x responses. Or to say this differently, Gibson is concerned with the "expressed meaning" of stimuli, as contrasted to their "implicit meaning." From the standpoint of hypnotic effects, it is this last aspect of "meaning" which is significant. On the other hand, it is conceivable that other phenomena beside those we are concerned with take place in which "expressed meaning" plays the dominant role, and consequently Gibson's theory should by no means be totally rejected. It does not apply to the present problem because it deals with a phenomenon not relevant to it, not because it is intrinsically wrong.

Interesting and useful as Osgood's theory may have been to us, this does not mean it is correct. Indeed, we may well ask how well is it founded on experimental data. Osgood is rather silent on this matter. Now, if his theory, or rather the version of it presented earlier, is correct, one may make an interesting and testable prediction. Namely, in the learning of paired associates, learning and recall should be greater when the stimulus member of the pairs is "meaningful" than when it is "meaningless." Here then is a test of the theory. As it happens, three investigations have been made in the past which deal with the effect of position of "meaningful" and "meaningless" items in the above situation. On the other hand, one must regretfully

add that they have not settled the issue. Two of these studies, done respectively by Cason (1), and by Winzen (24), report data supporting the prediction. But the best and most recent of these studies, that of Sheffield (17) contradicts the first two, hence does not support the hypothesis. If all three investigations were fully comparable, there is little question that the high quality of Sheffield's work would force us to reject the other two in its favor and to either reject Osgood's hypothesis, or at least alter it appreciably. The facts are, however, that the three studies are nowhere near being comparable, as Sheffield himself recognizes. He accounts for the discrepancies mainly on the basis that his experimental conditions must have necessarly given rise to "response patterning," a phenomenon which, he points out, was not likely to have been present in the other two studies. What this may mean is that Osgood's hypothesis holds for some learning situations, but not for all. Or what is probably a more accurate statement, Osgood's hypothesis is of general application alright, but in certain learning situations, such as that used by Sheffield, it is either unable to manifest itself or its manifestations are masked by other dominant effects. The crucial question obviously becomes then whether the situations which were used in the investigations reviewed at the start of this paper would or would not have led to "response patterning." It is not possible to fully tease out the answer from the material which is available. On the other hand, from the limited information available, it can be said that at present it would appear the situations which were involved were not comparable to the one in Sheffield's work, and indeed, were *more like those* in the two rival investigations. Thus, although the question remains largely open, the available information favors the interpretation presented in the previous pages. But it is certain that no categorical decisions can yet be made.

Admittedly, the solution offered in these pages is not exactly a simple one. Furthermore, it leaves many points unsettled. Nevertheless, it does demonstrate an important point. Namely, that there is as yet no necessity for seeking beyond normal waking learning phenomena for the explanation of the reported effects of hypnosis on recall. At least this is true in so far as retroactive inhibition (20) and "meaningful" and "nonsense" material are concerned. It is possible to construct a relatively adequate model from existing facts and theories. If anything, our failure to settle certain questions and to prove positively the correctness of the model lies in the inadequacies of the available data in the area of learning. In particular, our attempts to elucidate the problem have shown that it is impossible to deal with it intelligently unless the multidimensionality of "meaning" is recognized, and proper scales of "meaningfulness" are made available for each dimension used. They have also shown that the availability of an adequate theory of "meaning" is an essential requirement.

This brings us to a final remark. In relatively recent times, a few investigators of hypnosis have tried to emphasize the usefulness of the latter as a tool for investigating psychological phenomena in general. However, one aspect of hypnotism which seems to the present writer to have been largely overlooked thus far in such applications is its value as a tool and as a guide in theory construction and in the designing of experiments to test existing theories in psychology and related fields. The present paper is, in a way,

a testimony to the usefulnes of hypnotism in this respect. No little work has been done in the field of learning. Much controversy has arisen in regard to theoretical interpretations. Yet in all this time, no one has faced the fact that before any theory of learning could be fully accepted it would have to account for learning phenomena as seen in the hypnotic as well as the waking state. Any theory that does less than this is incomplete. No claim will be made here that the model which has been developed is the final answer. It may well prove eventually to be totally inadequate. Or it may be that a superior alternative will be formulated in the future. Be it as it may, the present attempt to account for hypnotic phenomena in the area of learning has raised fundamental issues with respect to both methodology and theory. It has given rather clear indications that certain past theoretical approaches are not adequate since they cannot encompass hypnotic phenomena. Finally, it has pointed the way future experiments might take.

Summary

1. Past investigations of recall in hypnosis have been reviewed. The results appear to indicate that hypnosis favors the recall of "meaningful" material over that of nonsense material above and beyond the difference in recall known to exist in the waking state for the recall of these two kinds of material. The results also *suggest* that the hypnotic increment is a monotonic increasing function of the "degree of meaningfulness."
2. Various important issues inherent in the problem under discussion have been examined. It is concluded that further gains in knowledge in this area demand the development of an adequate theory of "meaning," the recognization of the multidimensionality of "meaning," and the designing and constructing of satisfactory scales of "meaning."
3. A model was derived from Osgood's Mediation Hypothesis and Hull's theory of learning. This model accounts for the effects of "meaningfulness" upon learning and recall in the waking state. According to it, a stimulus has "meaning" to the extent that certain kinds of implicit cue-producing responses are attached to it. When such a stimulus becomes associated with an overt response in a learning situation, each implicit response takes on the function of a stimulus and as such becomes associated with the overt response. The net effect is a stimulus compounding situation in which the net reaction potential increases with the number of implicit responses involved, hence with the degree of "meaningfulness" of the stimulus. From this the well-known greater recall associated with "meaningful" material follows. With increase in "meaningfulness" there is, however, also an increase in interference due to stimulus generalization. Application of the principle of the hypnotic stimulus shift developed in a previous paper allows one to account for the reported effects of hypnosis upon recall.
4. In final conclusions the value of hypnosis as a tool for deciding between alternate theories, and as a guide in theory construction and in the designing of experiments is emphasized in the light of the material of this paper.

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